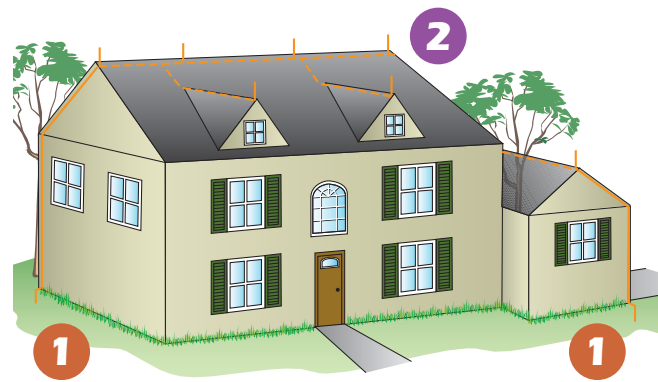


# Protection for the Home

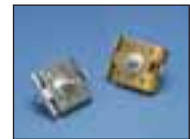
Below is a typical design example, for a single home structure.



## Common Lightning Protection Components



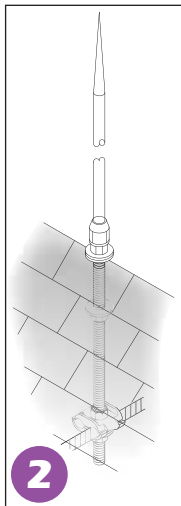
Cable Fastener



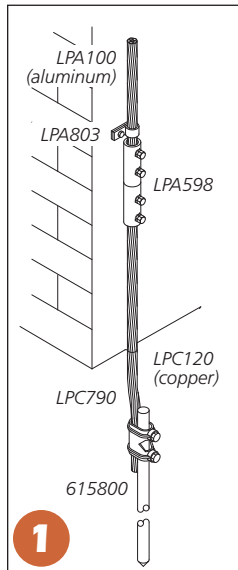
Parallel Cable Clamp



Bi-Metallic Cable Connection



Through Roof Air Terminal Assembly



## Common Surge Protection Components



Main Panel



Cable Television



Telephone



Security Cameras

The content of this booklet is designed to provide the residential contractor with the basic information and knowledge about the aspects of lightning protection as it applies to a typical residential home application. The information included is referenced from a number of relevant standards within the USA, including the NEC® electrical code and the NFPA® lightning protection standard.

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# Residential Lightning Protection & Surge Protection



## Direct Lightning Strike

Today, more so than ever, the typical residential home is susceptible to the risks of both direct and indirect lightning strikes.

Lightning not only poses the direct risk of fire to the home, but with more electronic equipment such as home entertainment systems, home office equipment, security alarm monitoring and modern appliances, the risk and expense of damage is increasing.

### Is your home at risk of being hit by lightning?

Following the simplified risk assessment guide below you can determine the level of risk your home is exposed to from lightning. It's important to note that this risk assessment chart should be used as a guide on whether the risk is high enough to require direct strike protection to the home structure. The guide is based on lightning frequency data from the southeast of the United States. Electrical power surge protection for the home in this modern world should be assumed as essential in reducing the risk of damage to electrical equipment within the home.

	Ranch Style (Single Level)	Single Family (Double Level)
Home surrounded by other homes of similar height, within a distance of 3x height of the home	Fair	Medium
Home surrounded by other homes of smaller height, within a distance of 3x height of the home	Medium	Great
Isolated Home, not surrounded by other homes less than 3x height of the home	Great	Great

NFPA780 Risk Assessment Guide – 2008

Even in cases with low risk of a direct strike to a home, the event is still possible, and the risk should be evaluated against the relative cost of undertaking protection for the home. In some states, a premium reduction on home insurance may also be applicable. Please contact your insurance provider for more information.

The areas of risk and safety that need consideration can be categorized as follows:

1. Physical direct lightning strike protection of the home
2. Protection of electrical equipment within the home



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**How to provide protection**

A direct strike lightning protection installation for the home consists of the following four essential components (standard practice is defined within the UL®96A installation requirements for lightning protection systems):

**1 Air Terminals**

The function of an air terminal is to capture the lightning strike, therefore each air terminal needs to be located on a point on the structure that has a high probability of being struck by lightning. Some of these key design rules are stated below:

- a. Air terminals shall be provided on all roof projections (such as dormers, chimneys).
- b. Air terminals shall extend at least 10 inches above the roof-line or area to be protected.
- c. Air terminals greater than 24 inches in height shall be braced.
- d. Air terminals shall be placed within 2 feet of roof ridge ends or within 2 feet of outside edges or corners on flat roofs.

**2 Interconnecting Conductors**

The function of the conductors is to provide an electrical path from the air terminals to ground. Some of the key requirements relevant to residential homes are stated below:

- a. No less than two down conductors shall be provided from the air terminal system to the grounding system. These down conductors from the roof to ground level shall be installed at opposite ends of the structure.
- b. There must be at least two conductor paths to ground for each air terminal (some exceptions may exist based on the structure.)
- c. All roof top metallic objects (i.e. antennae, gutters, vent) should be bonded to the conductor system.
- d. The conductor can be either copper or aluminum and must be UL® listed for the application of a lightning conductor.

**3 Protection of Electrical Equipment Within the Home**

Sensitive electronics are now present in a range of equipment in the home, including TVs, home entertainment systems, home office equipment, security alarm systems, air conditioning systems and most home appliances. Although direct lightning strikes are the most spectacular form of energy that can damage your valuable household electrical equipment, it's only one source of damage. Other sources include operation or switching of electrical equipment and indirect lightning surges on the power network. It is important to note that lightning does

not need to directly strike a power line or your home to result in damaged equipment within your home. A lightning strike several hundred feet away can induce a damaging surge into the electrical, telephone or other services entering your home, even to underground cables. It is possible to provide protection against this threat by coordinating a "whole house" surge protection plan. A hardwired surge protector installed on your electrical panel can help protect electrical equipment within your home. All other incoming conductive lines must be considered including, but not limited to, telephone, cable TV and satellite dishes.

**Direct Lightning Strike Protection for the Home**



**4 Grounding System**

The function of the grounding electrodes (rods) is to provide a point for the lightning discharge to enter the ground. It typically consists of a copper-bonded ground rod, driven into the ground, outside the perimeter line of the structure.

**WARNING:** Care must be taken that no services exist in the ground beneath before driving any ground electrodes.

A ground electrode, driven to a depth of 10 feet typically is required at the base of every down conductor. Some of the requirements for lightning protection grounding, relevant to residential homes, are stated below:

- a. Ground electrode shall be at least ½ inch diameter by 8 feet long, copper-bonded electrodes are recommended.
- b. If rocky soil, services underground, or other reasons prevent a vertical electrode from being driven, a horizontal conductor, buried at least 18 inches below the ground, and extending no less than 12 feet away from the structure can be used.
- c. All grounding systems shall be interconnected using the same sized (copper) conductor that was used as the lightning conductor. These grounded systems include lightning protection, electrical service ground, telephone service ground bond, antenna system (i.e. satellite TV) grounds. Note the electrical and telephone grounds should (by code) already be bonded, however it is advisable to confirm this with a qualified technician. The Intersystem Bonding Termination (IBTB) from ERICO is ideal for residential bonding, is UL® Listed and meets the requirements of 2011 NEC®.
- d. In a similar method to point c above, interconnecting bonds are required to all underground metallic piping systems. This includes water piping, gas piping, underground conduits or well casings within 25 feet of the home. In the case of metal pipe systems that are interconnected with a section of plastic pipe, or non conductive fixing (joint) this section of the pipe shall be bridged using a lightning sized conductor and purpose designed pipe bond.
- e. If all services are already bonded prior to the lightning protection being installed, it is only necessary to bond from the nearest lightning protection ground electrode to the water pipe system.